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AREI UPDATES: Pest Management on Field Crops

Updates on Agricultural Resources and Environmental Indicators

Natural Resources and Environment Division
Economic Research Service, U.S. Department of Agriculture

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Number 19

1994 Pest Management on Major Field Crops

- **Herbicides were applied in 1994 to nearly all surveyed acres of corn, soybeans, cotton, potatoes, and spring wheat, but to only 49% of winter wheat.**
- **Insecticides were commonly applied to potatoes (88%) and cotton (71%), but to only one-fourth or less of the other major crops.**
- **Fungicides, desiccants, growth regulators, and other pesticides were frequently used on cotton and fall potatoes, but seldom applied to corn, soybeans, or wheat.**
- **Scouting for insects, weeds, or disease occurred on three-fourths or more of the surveyed corn, soybeans, and cotton acreage. The operator or an employee performed the majority of scouting except for crop consultants on cotton.**

The 1994 Cropping Practices Surveys gathered information on pesticide use and other pest management in the major States producing corn (10 States), soybeans (9 States), cotton (6 States), winter wheat (13 States), spring wheat (5 States), and fall potatoes (11 States). While herbicides were applied to most surveyed acres in the major crops, average application per treated acre varied among crops and States from under 1 lb. on wheat to over 3 lbs. on corn and 4 lbs. on fall potatoes.

Insecticide applications, while occurring on relatively more potato acreage, were more intense on cotton. On average, 5.4 insecticide treatments were made on cotton during the growing season using 3.5 different insecticide ingredients. Treatments were most frequent in Louisiana and Mississippi where cotton acres were treated an average of 9 or more times. Treatments were least frequent in California and Texas, at fewer than three. While most potato acres were also treated with insecticide, the majority received fewer than three treatments and fewer than two ingredients. For corn, insecticide application was generally limited to a single treatment with one ingredient.

Professional scouting services by crop consultants, chemical dealers, or the Extension Service were generally employed on crops and in regions most susceptible to insect damage. Over 80 percent of the cotton acreage in Louisiana and Mississippi was scouted by a crop consultant. In comparison, less than 20 percent of the corn or soybean acreage in Nebraska, the highest State, was scouted professionally. Other States with professional scouting on 15 percent or more of the corn or soybeans were Arkansas, Illinois, Indiana, Iowa, Minnesota, and Ohio. On corn and soybean acres not professionally scouted, the farm operator or an employee frequently did some scouting.

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About AREI UPDATES

AREI UPDATES is a periodic series that supplements and updates information in **Agricultural Resources and Environmental Indicators (AREI)**, USDA, ERS, AH-705, Dec. 1994. These **UPDATES** report recent data from surveys of farm operators and others knowledgeable about changing agricultural resource use and conditions, with only minimal interpretation or analysis. Please contact the individual listed at the end of the text for additional information about the data in this **UPDATE**. If you would like to be added to the mailing list or have other questions about **AREI UPDATES** or **AREI**, contact Richard Magleby, (202) 219-0436 [rmagleby@econ.ag.gov].

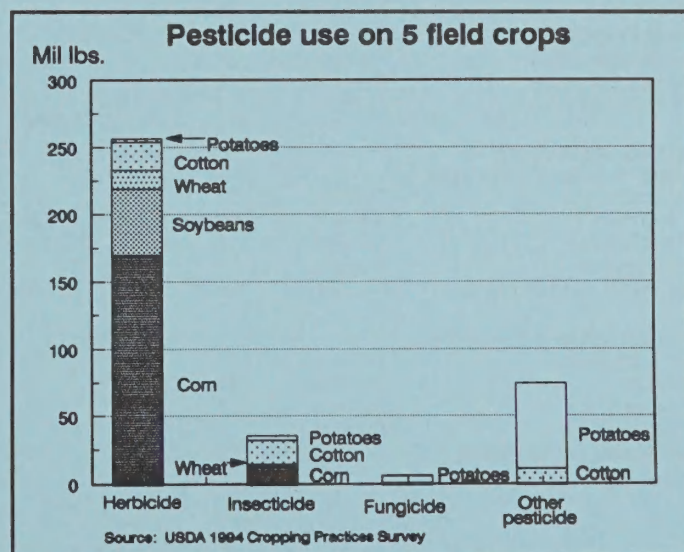


Table 1—Pest management practices on corn, major producing States, 1984

Data item	Units 1/	IL	IN	IA	MI	MN	MO	NE	OH	SD	WI	Total
Planted area	1,000 ac.	11,600	6,100	13,000	2,550	7,000	2,400	8,600	3,700	3,800	3,750	62,500
Land receiving pesticides	Percent	100	99	99	98	98	97	98	98	93	98	98
Land receiving herbicides	Percent	99	98	99	98	98	96	97	98	93	97	98
Land receiving insecticides	Percent	31	24	27	24	9	16	53	19	7	25	26
Amount of pesticide used	1,000 lbs.	40,911	20,820	41,155	7,605	15,648	6,926	22,258	11,922	7,433	9,326	184,003
All pesticide application rate	lbs./ac.	3.5	3.5	3.2	3.0	2.3	3.0	2.6	3.3	2.1	2.5	3.0
Herbicide applied	1,000 lbs.	37,939	19,649	38,124	6,982	15,065	6,816	18,807	11,402	7,286	8,424	170,495
Herbicide application rate	lbs./ac.	3.3	3.3	3.0	2.8	2.2	2.9	2.3	3.1	2.0	2.3	2.8
Insecticide applied	1,000 lbs.	3,020	1,199	2,967	568	497	177	3,476	513	207	909	13,532
Insecticide application rate	lbs./ac.	0.8	0.8	0.9	1.0	0.9	0.4	0.8	0.8	1.5	1.0	0.8
Herbicide practices												
Land by number of treatments and herbicide type:												
No treatments	Percent	1	2	1	2	2	4	3	2	7	3	3
1 treatment	Percent	50	63	45	70	45	69	59	53	49	60	53
2 treatments	Percent	44	29	50	21	43	24	32	42	37	31	39
3 or more	Percent	5	6	4	7	11	3	6	3	7	6	6
Pre-emergence only	Percent	41	53	30	55	14	62	54	35	30	42	39
Post-emergence only	Percent	17	13	21	23	35	13	9	19	32	35	21
Pre- and post-emergence	Percent	41	32	48	20	49	20	34	44	32	19	38
Ave. number of treatments	No.	1.54	1.43	1.61	1.37	1.66	1.31	1.45	1.48	1.56	1.46	1.52
Land by number of ingredients applied:												
1 active	Percent	8	5	10	14	12	14	15	8	23	16	11
2 active	Percent	44	52	37	51	47	55	48	37	33	40	44
3 active	Percent	35	29	43	20	33	19	26	32	32	31	33
4 or more	Percent	12	12	10	13	6	8	8	21	5	11	10
Ave. number of ingredients	No.	2.5	2.5	2.5	2.4	2.3	2.2	2.3	2.7	2.2	2.4	2.5
Area treated:												
Before planting	Percent	32	31	19	9	7	32	13	13	12	9	19
At planting	Percent	5	11	5	14	3	16	24	6	8	3	9
After planting	Percent	25	32	34	61	49	26	31	53	44	71	38
Before and at	Percent	2	3	1	*	*	2	2	*	1	1	1
Before and after	Percent	32	15	33	4	25	14	8	15	16	11	21
At and after	Percent	3	6	7	6	14	3	20	9	11	2	8
By farm operator only	Percent	44	59	52	65	57	57	59	58	64	53	55
By custom applicator	Percent	46	32	33	24	23	31	28	30	21	39	33
By both	Percent	9	7	13	6	17	4	10	9	8	4	10
By ground broadcast	Percent	94	83	92	73	84	78	61	89	62	78	82
By aerial broadcast	Percent	2	1	1	1	2	*	1	*	4	1	2
By in furrow	Percent	1	4	*	2	1	1	1	*	*	2	1
By chemigation	Percent	*	3	*	*	1	*	*	*	*	*	*
By band treatment	Percent	2	3	14	7	18	5	43	4	25	1	14
By directed spray	Percent	2	11	1	15	11	16	9	9	18	17	8
By spot treatment	Percent	3	8	2	2	5	3	5	5	*	3	4
Insecticide practices												
Land by number of treatments:												
No treatments	Percent	69	78	73	77	91	85	49	82	93	75	74
1 treatment	Percent	30	21	26	22	9	15	38	17	7	24	24
2 treatments	Percent	1	*	1	1	*	1	10	1	*	*	2
3 treatments	Percent	*	*	*	*	*	*	2	*	*	*	*
Ave. number of treatments	No.	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.0	1.0	1.0	1.1
Land by number of ingredients:												
No ingredients	Percent	69	76	73	76	91	84	47	81	93	75	73
1 active	Percent	31	23	26	23	9	16	42	18	7	25	25
2 active	Percent	1	*	1	1	*	1	9	1	*	*	2
3 active	Percent	*	*	*	*	*	*	1	*	*	*	*
Ave. number of ingredients	No.	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.0	1.0	1.0	1.1

Continued

Table 1—Pest management practices on corn, major producing States, 1994—continued

Data item	Units 1/	IL	IN	IA	MI	MN	MO	NE	OH	SD	WI	Total
Area treated:												
Before planting	Percent	2	3	0	*	*	6	1	1	*	1	1
At planting	Percent	21	17	22	19	7	5	23	12	6	21	17
After planting	Percent	8	4	3	5	1	5	21	5	1	3	7
Before and at	Percent	*	*	*	*	*	*	*	*	*	*	*
At and after	Percent	1	*	1	1	*	1	7	1	*	*	1
By farm operator only												
By custom applicator	Percent	27	22	23	20	8	9	36	16	7	22	22
By both	Percent	4	1	4	4	*	7	12	2	*	3	4
	Percent	*	*	*	1	*	*	5	1	*	*	1
By ground broadcast												
By aerial broadcast	Percent	8	7	2	4	*	11	5	7	*	3	4
By in furrow	Percent	1	1	2	*	*	*	17	*	*	*	3
By chemigation	Percent	5	8	7	6	4	1	8	5	4	8	6
By band treatment	Percent	*	*	*	*	*	*	2	*	*	*	*
By directed Spray	Percent	17	7	16	13	4	2	28	7	3	14	14
	Percent	1	1	*	2	*	2	1	1	*	*	1
Other pest management practices												
Plant density:												
< 15,000 plants	Percent	3	6	*	11	3	3	3	6	*	3	3
15,000 - 25,000	Percent	66	72	61	67	32	76	50	65	72	58	58
> 25,000	Percent	31	25	39	25	65	9	36	32	13	39	36
Ave. plant population	1000 plants/ac	23	23	24	22	26	20	22	23	19	24	23
Row spacing:												
10-29 inches	Percent	3	6	*	11	3	3	3	6	*	3	3
29-34 inches	Percent	70	79	67	77	71	71	46	79	31	48	65
34-39 inches	Percent	24	15	30	12	6	23	46	15	60	42	29
39-41 inches	Percent	3	*	6	*	2	3	5	3	9	9	3
Ave. row space	inches	32	31	33	31	32	45	40	42	49	34	36
Tillage system:												
Conventional w/o m/bd. plow	Percent	55	50	47	46	61	55	35	46	48	40	48
Conventional with m/bd. plow	Percent	4	7	3	17	20	2	2	12	6	36	8
Mulch tillage	Percent	20	16	34	17	14	17	25	14	28	17	22
No till	Percent	21	25	15	13	1	21	25	25	10	7	17
Ridge till	Percent	*	*	1	*	2	1	13	*	1	1	2
Ave. number of tillages	No.	2.5	2.5	2.5	2.9	3.2	2.7	2.5	2.7	2.8	3.4	2.7
Land cultivated												
Number of cultivations - -	Percent	51	38	74	40	83	37	87	26	81	63	63
1 cultivation	Percent	47	34	65	31	60	22	43	22	51	50	48
2 cultivations	Percent	4	4	8	8	21	14	41	3	27	11	14
3 or more	Percent	*	*	*	1	2	1	3	1	4	2	1
Ave. times cultivated	No.	1.1	1.1	1.1	1.3	1.3	1.4	1.5	1.2	1.4	1.3	1.3
Scouting activities:												
Area scouted	Percent	87	77	80	70	81	59	70	75	77	59	77
Area scouted by - -												
Operator or employee	Percent	80	73	75	64	75	58	44	68	71	51	68
Chemical dealer	Percent	14	7	15	5	9	*	6	15	4	7	10
Extension Service	Percent	*	1	1	*	*	*	*	1	1	1	*
Crop consultant	Percent	3	6	2	7	7	1	24	2	5	3	7
Majority of scouting by:												
Operator	Percent	74	69	69	58	71	56	41	65	70	49	64
Employee	Percent	1	1	1	1	1	1	1	1	1	1	1
Chemical dealer	Percent	7	2	6	4	4	*	5	8	1	6	5
Extension Service	Percent	*	*	*	*	*	*	*	1	*	1	*
Crop consultant	Percent	2	4	2	7	6	1	23	1	5	2	6
Other	Percent	2	*	2	*	*	*	1	*	*	*	1
Ave. scouting fee	\$/acre	2.34	3.28	3.54	3.04	3.46	1.33	5.35	2.76	2.90	4.47	4.31

1/ Units reported as percent represent percentage of planted area.

* insufficient data to make an estimate.

Source: USDA, 1994 Cropping Practices Survey

Table 2—Pest management practices on soybeans, major producing States, 1994

Data item	Units 1/	AR	DE	IL	IN	IA	MN	MO	NE	OH	Total
Planted area	1,000 ac.	3,450	225	9,600	4,700	8,800	5,700	4,600	2,900	4,000	43,975
Land receiving pesticides	Percent	99	87	99	99	100	99	93	97	99	98
Land receiving herbicides	Percent	98	87	99	99	100	99	93	97	99	98
Land receiving insecticides	Percent	2	3	1	1	*	*	1	*	*	1
Land receiving fungicides	Percent	1	2	*	*	*	*	*	*	*	*
Amount of pesticide used	1,000 lbs.	4,562	366	11,637	6,337	7,843	5,286	4,457	2,922	6,366	49,777
All pesticide application rate	lbs./ac.	1.3	1.9	1.2	1.4	0.9	0.9	1.0	1.0	1.6	1.2
Herbicide applied	1,000 lbs.	4,469	361	11,623	6,341	7,841	5,195	4,463	2,916	6,372	49,581
Herbicide application rate	lbs./ac.	1.3	1.8	1.2	1.4	0.9	0.9	1.0	1.0	1.6	1.1
Herbicide practices											
Land by number of treatments and herbicide type:											
No treatments	Percent	2	13	1	1	*	1	7	3	1	2
1 treatment	Percent	42	53	41	56	33	33	64	54	57	45
2 treatments	Percent	44	17	45	38	58	52	25	34	31	43
3 or more treatments	Percent	12	17	14	6	8	15	4	8	11	9
Pre-emergence only	Percent	30	65	19	34	18	9	48	40	43	27
Post-emergence only	Percent	17	7	30	30	32	33	20	22	27	28
Pre- and post-emergence	Percent	51	20	51	34	50	57	24	35	30	44
Ave. number of treatments	No.	1.73	1.63	1.78	1.52	1.77	1.87	1.37	1.53	1.56	1.68
Land by number of ingredients applied:											
1 active ingredient	Percent	12	2	12	13	9	16	15	18	7	12
2 active ingredients	Percent	37	29	32	31	45	43	42	35	35	38
3 active ingredients	Percent	40	28	30	25	26	24	22	29	32	28
4 active ingredients	Percent	7	18	16	18	12	11	10	7	16	13
5 or more	Percent	3	11	9	12	8	6	3	7	9	8
Ave. number of ingredients	No.	2.5	3.2	2.8	2.9	2.7	2.5	2.4	2.5	2.9	2.7
Area treated:											
Before planting	Percent	35	31	21	26	15	7	47	26	28	23
At planting	Percent	4	2	2	5	*	*	4	11	8	3
After planting	Percent	18	40	28	35	27	32	20	23	43	29
Before/at	Percent	2	*	3	1	*	1	1	4	1	1
Before/after	Percent	36	8	43	29	56	57	18	24	15	39
At/after	Percent	1	4	2	3	2	2	3	8	4	3
Before/at/after	Percent	2	*	*	*	*	1	*	*	*	*
By farm operator only	Percent	65	68	46	55	60	61	59	69	54	57
By custom applicator	Percent	22	17	45	41	29	22	32	19	37	33
By both	Percent	11	1	8	3	10	16	2	9	8	8
By ground broadcast	Percent	85	73	96	82	98	92	81	82	86	90
By aerial broadcast	Percent	16	3	1	1	*	3	2	*	*	2
By in furrow	Percent	2	*	*	*	*	*	1	1	1	*
By chemigation	Percent	*	*	1	1	*	*1	*	1	*	*
By band treatment	Percent	5	3	4	3	15	14	3	21	5	8
By directed spray	Percent	6	12	2	16	1	10	11	5	9	7
By spot treatment	Percent	*3	3	4	9	10	3	2	8	5	*
Other pest management practices											
Plant density:											
Less than 75,000 plants/acre	Percent	26	*	3	9	3	*6	8	10	6	
75,000 or more	Percent	74	*	97	91	97	100	84	82	90	84
Ave. plant population	1000 plants/ac	113	*	145	146	148	160	148	135	155	145
Row spacing:											
Under 10 inches	Percent	23	*	41	54	18	30	44	14	67	36
10-29 inches	Percent	38	*	18	20	27	26	24	14	18	12
29-34 inches	Percent	13	*	35	24	42	34	22	61	10	30
34 or more inches	Percent	26	*	6	2	13	9	10	38	5	11
Ave. row space	inches	23	*	19	16	24	20	18	28	13	20
Tillage system:											
Conventional w/o m/bd. plow	Percent	87	33	38	31	44	33	49	38	30	42
Conventional with m/bd. plow	Percent	*	19	3	9	4	32	1	2	15	8
Mulch tillage	Percent	8	6	27	13	34	29	22	39	16	25
No till	Percent	6	30	32	46	18	4	26	18	39	24
Ridge till	Percent	*	*	*	*	1	*	4	*	1	*
Ave. number of tillages	No.	4.4	2.9	2.7	2.3	3.1	3.8	2.8	2.6	2.5	3.0
Used a crop rotation	Percent	32.1	75.6	97.2	96.8	98.4	99.3	80.3	96.1	90.6	93.2
Land cultivated	Percent	54	29	42	22	57	55	34	64	14	43
Number of cultivations:											
1 cultivation	Percent	15	5	31	17	40	32	13	40	8	27
2 cultivations	Percent	26	17	11	5	15	21	18	22	6	15
3 or more	Percent	13	7	*	0	1	1	3	2	1	2
Ave times cultivated	No.	2	2	1	1	1	1	2	1	1	1
Area scouted	Percent	71	90	85	74	78	87	57	60	76	76
Area scouted by:											
Operator or employee	Percent	70	82	79	68	73	82	57	55	66	71
Chemical dealer	Percent	9	5	18	15	14	7	1	1	20	12
Extension Service	Percent	4	*	*	1	1	*	1	*	*	1
Crop consultant	Percent	5	5	2	2	1	9	*	5	6	3
Majority of scouting by:											
Operator	Percent	66	81	77	66	70	76	53	53	61	68
Employee	Percent	1	1	1	*	1	*	3	1	1	1
Chemical dealer	Percent	2	3	6	5	5	3	1	1	11	5
Extension Service	Percent	*	*	*	*	1	*	*	*	*	*
Crop consultant	Percent	2	5	1	2	1	7	*	5	3	2
Other	Percent	*	*	1	*	1	*	*	*	*	*
Ave. scouting fee	\$/acre	4.6	1.8	4.4	2.4	2.5	2.9	0.6	5.1	0.8	3.2

1/ Units reported as percent represent percentage of planted area.

* insufficient data to make an estimate.

Source: USDA, 1994 Cropping Practices Survey

Table 3—Pest management practices on cotton, major producing States, 1994

Data item	Units 1/	AZ	AR	CA	LA	MS	TX	Total
Planted area	1,000 ac.	313	980	1,100	900	1,280	5,450	10,023
Land receiving pesticides	Percent	97	100	100	100	100	98	99
Land receiving herbicides	Percent	71	97	85	87	100	96	94
Land receiving insecticides	Percent	83	94	94	100	100	50	71
Land receiving fungicides	Percent	5	18	2	18	36	1	9
Land receiving other pesticides	Percent	74	86	96	76	93	49	67
Amount of pesticide used	1,000 lbs.	2,648	7,053	8,066	7,531	12,862	12,374	50,535
All pesticide application rate	lbs./ac.	8.73	7.20	7.33	8.37	10.05	2.31	5.10
Herbicide applied	1,000 lbs.	308	4,080	1,612	3,047	5,431	6,389	20,866
Herbicide application rate	lbs./ac.	1.54	4.31	1.75	3.88	4.24	1.23	2.23
Insecticide applied	1,000 lbs.	1,183	1,638	1,869	3,727	5,185	4,025	17,628
Insecticide application rate	lbs./ac.	4.5	1.8	1.7	4.1	4.1	1.5	2.5
Fungicide applied	1,000 lbs.	*	108	*	94	485	*	755
Fungicide application rate	lbs./ac.	*	0.6	*	0.6	1.0	*	0.9
Other pesticide applied	1,000 lbs.	1,065	1,228	4,844	663	1,761	1,956	11,518
Other pesticides application	lbs./ac.	4.8	1.5	4.4	1.0	1.5	0.7	1.7
Herbicide practices								
Land by number of treatments and pesticide type:								
No treatments	Percent	29	3	15	13	*	4	6
1 treatment	Percent	43	5	29	5	2	38	26
2 treatments	Percent	20	11	40	24	7	41	31
3 treatments	Percent	6	20	12	24	13	14	15
4 treatments	Percent	*	26	3	7	27	*	8
5 treatments	Percent	*	16	*	1	21	1	5
6 or more	Percent	*	20	1	15	30	1	8
Pre-emergence only	Percent	43	1	18	*	1	57	35
Post-emergence only	Percent	22	8	8	5	1	1	5
Pre- and post-emergence	Percent	22	88	46	83	98	38	55
Ave. number of treatments	No.	1.52	4.24	1.94	3.71	4.69	1.85	2.64
Land by number of ingredients applied:								
1 active	Percent	31	3	36	1	1	41	28
2 active	Percent	32	4	36	13	6	35	26
3 active	Percent	5	22	12	25	4	16	15
4 active	Percent	3	18	*	13	22	3	7
5 active	Percent	*	15	*	21	22	*	6
6 active	Percent	*	24	*	7	21	*	6
7 or more	Percent	*	10	*	8	25	*	4
Ave. number of ingredients	No.	1.7	4.6	1.7	4.1	5.3	1.8	2.7
Area treated:								
Before planting	Percent	38	6	27	13	1	35	25
At planting	Percent	5	7	2	*	1	2	4
After planting	Percent	8	7	17	15	7	6	6
Before/at	Percent	*	8	4	3	2	18	12
Before/after	Percent	15	21	32	17	11	22	21
At/after	Percent	*	12	1	21	15	3	6
Before/at/after	Percent	*	36	2	18	63	10	19
By farm operator only	Percent	43	80	56	72	82	76	74
By custom applicator	Percent	23	*	17	10	2	10	8
By both	Percent	*	17	11	15	16	9	11
By ground broadcast	Percent	34	56	59	47	78	83	72
By aerial broadcast	Percent	5	17	13	17	18	4	9
By in furrow	Percent	3	5	1	8	14	1	4
By chemigation	Percent	11	3	1	1	*	*	1
By band treatment	Percent	2	74	9	54	77	37	43
By directed spray	Percent	17	45	18	36	56	4	20
By injected or knifed in	Percent	3	*	14	10	7	4	6
By spot treatment	Percent	3	7	7	2	18	19	14
Insecticide practices								
Land by number of treatments applied:								
No treatments	Percent	17	6	6	*	*	50	29
1 treatment	Percent	2	18	31	*	*	18	15
2 treatments	Percent	5	7	24	*	*	9	9
3 treatments	Percent	3	17	18	*	1	5	7
4 treatments	Percent	3	14	10	1	1	5	5
5 treatments	Percent	8	3	6	11	7	1	4
6 or more	Percent	63	34	4	97	91	12	31
Ave. number of treatments	No.	8.0	4.8	2.5	9.8	10.0	3.6	5.7
Land by number of ingredients applied:								
1 active ingredient	Percent	9	19	32	2	2	21	18
2 active ingredients	Percent	2	12	23	11	9	9	11
3 active ingredients	Percent	11	17	14	30	15	10	13
4 active ingredients	Percent	6	20	11	20	21	2	9
5 active ingredients	Percent	26	12	5	15	12	4	8
6 active ingredients	Percent	9	7	3	6	12	2	4
7 active ingredients	Percent	11	2	2	10	5	1	3
8 active ingredients	Percent	8	2	*	3	13	*	2
9 or more	Percent	2	2	3	2	10	1	2
Ave. number of ingredients	No.	4.9	3.5	2.7	4.2	5.3	2.5	3.5
Area treated:								
Before planting	Percent	*	*	2	*	*	*	*
At planting	Percent	*	9	2	1	*	9	6
After planting	Percent	80	54	75	80	55	33	48
Before/after	Percent	2	1	3	5	2	1	2
At/after	Percent	*	29	12	13	42	6	14
Before/at/after	Percent	*	2	*	*	*	*	*
By farm operator only	Percent	6	42	39	32	21	26	28
By custom applicator	Percent	68	15	35	31	18	13	19
By both	Percent	9	37	19	37	61	11	23
By ground broadcast	Percent	15	44	27	29	62	18	28
By aerial broadcast	Percent	69	51	49	82	82	24	44
By in furrow	Percent	2	33	2	9	30	8	13
By chemigation	Percent	2	*	1	*	*	*	*
By band treatment	Percent	2	19	10	20	28	14	16
By directed spray	Percent	12	3	37	24	12	3	10
By injected or knifed in	Percent	*	*	3	*	*	1	1
By spot treatment	Percent	2	4	3	*	1	*	1

Continued

Table 3—Pest management practices on cotton, major producing States, 1994—continued

Data item	Units 1/	AZ	AR	CA	LA	MS	TX	Total
Fungicide practices								
Land receiving no fungicide	Percent	95	83	98	91	74	99	94
Ave. number of treatments	No.	1.7	1.0	1.0	1.0	1.1	1.0	1.1
Ave. number of ingredients	No.	1.0	1.8	2.0	2.3	2.1	1.0	2.0
Other pesticide practices 2/								
Land by number of treatments applied:								
No treatments	Percent	26	14	4	24	7	51	33
1 treatment	Percent	31	44	24	47	24	34	34
2 treatments	Percent	22	26	52	25	7	11	18
3 or more	Percent	21	16	20	3	62	4	32
Ave. number of treatments	No.	2.1	1.9	2.1	1.5	3.6	1.5	2.0
Land by number of ingredients applied:								
1 ingredient	Percent	20	29	14	22	10	29	24
2 ingredients	Percent	35	34	42	51	31	13	25
3 ingredients	Percent	8	20	25	2	36	5	13
4 or more	Percent	11	5	16	1	17	2	5
Ave. number of ingredients	No.	2	2	2	2	3	2	2
Area treated:								
Before planting	Percent	2	*	*	*	1	*	*
At planting	Percent	*	*	*	1	*	2	1
After planting	Percent	72	83	93	75	93	47	65
Before/after	Percent	*	*	3	*	*	*	*
By farm operator only								
By custom applicator	Percent	9	35	23	20	21	28	26
By both	Percent	65	41	65	54	42	19	34
	Percent	*	7	8	2	30	3	7
By ground broadcast								
By aerial broadcast	Percent	6	33	18	5	35	16	19
By in furrow	Percent	55	50	73	61	78	20	41
By chemigation	Percent	*	1	*	2	*	*	*
By band treatment	Percent	3	*	*	*	*	*	*
By directed spray	Percent	2	9	1	*	10	5	5
By injected or knifed in	Percent	9	*	18	8	5	12	10
By spot treatment	Percent	*	*	2	*	*	*	*
Other pest management practices								
Plant density:								
< 20,000 plants/acre	Percent	9	5	10	5	5	6	6
20,000 - 60,000	Percent	77	92	82	95	93	62	74
> 60,000	Percent	14	3	8	*	1	28	17
Ave. plant population	1000 plants/ac	40	39	40	36	37	50	44
Land by row widths:								
10-29 inches	Percent	*	*	*	*	*	*	*
29-34 inches	Percent	3	4	23	5	6	8	8
34-39 inches	Percent	63	76	45	46	58	17	36
39-41 inches	Percent	34	20	32	49	36	75	56
Ave. row space	inches	38	38	37	39	38	39	39
Tillage system:								
No system identified	Percent	14	*	15	*	*	*	2
Conventional w/o mibd. plow	Percent	31	100	82	99	97	86	88
Conventional with mibd. plow	Percent	55	*	3	*	1	14	10
Mulch tillage	Percent	*	*	*	*	*	*	*
No till	Percent	*	*	*	1	2	*	1
Average number of tillages	No.	7.23	6.02	7.35	6.09	5.81	6.26	6.30
Used a crop rotation	Percent	31	13	47	9	5	41	31
Land cultivated	Percent	95	99	99	99	99	98	98
Number of cultivations								
1 cultivation	Percent	*	6	1	9	5	8	6
2 cultivations	Percent	8	12	14	20	22	25	21
3 or more	Percent	88	81	85	70	72	65	71
Ave times cultivated	No.	5	4	4	4	3	3	3
Scouting activities								
Area scouted	Percent	92	98	84	95	98	81	87
Area scouted by:								
Operator or employee	Percent	42	53	67	22	58	55	53
Chemical dealer	Percent	37	12	47	1	17	11	16
Extension Service	Percent	*	11	2	1	2	4	4
Crop consultant	Percent	31	57	23	80	82	28	42
Majority of scouting by:								
Operator	Percent	22	21	14	5	13	42	29
Employee	Percent	3	6	20	1	7	3	5
Chemical dealer	Percent	29	7	31	*	5	7	9
Extension Service	Percent	*	7	*	*	*	2	2
Crop consultant	Percent	29	55	20	78	73	27	39
An other source	Percent	9	*	*	11	*	*	2
Ave. scouting fee	\$/acre	7.83	5.48	5.90	6.53	5.43	4.43	5.39
Purchased beneficial insects	Percent	3	*	2	*	1	3	2
Pheromones used to control or to monitor pests	Percent	54	49	13	5	55	6	19

1/ Units reported as percent represent percentage of planted area.

2/ Includes all other pesticides used by surveyed cotton growers such as defoliants and growth regulators.

* insufficient data to make an estimate.

Source: USDA, 1994 Cropping Practices Survey

Table 4—Pest management practices on winter wheat, major producing States, 1994

Data item	Units 1/	CO	ID	IL	KS	MO	MT	NE	OH	OK	OR	SD	TX	WA	Total
Planted area	1,000 ac.	2,550	790	900	11,400	1,100	1,850	2,100	1,180	5,300	870	1,350	2,900	2,300	34,590
Land receiving pesticides	Percent	47	83	30	49	14	95	58	22	54	98	84	48	92	56
Land receiving herbicides	Percent	34	83	30	48	8	95	58	22	27	98	84	28	92	49
Land receiving insecticides	Percent	18	*	*	1	3	9	*	*	41	3	*	31	1	11
Land receiving fungicides	Percent	*	2	*	*	3	*	*	*	*	10	*	*	3	1
Amount of pesticide applied	1,000 lbs.	526	552	23	1,250	23	1,189	360	74	998	587	349	606	1,186	7,723
All pesticide application rate	lbs./ac.	0.4	0.8	0.1	0.2	0.2	0.7	0.3	0.3	0.3	0.7	0.3	0.4	0.6	0.4
Herbicide applied	1,000 lbs.	251	547	23	1,216	15	1,175	357	75	175	562	341	216	1,133	6,084
Herbicide application rate	lbs./ac.	0.3	0.8	0.1	0.2	0.2	0.7	0.3	0.3	0.1	0.7	0.3	0.3	0.6	0.4
Insecticide applied	1,000 lbs.	275	*	*	*	*	*	*	*	819	*	*	391	*	1,553
Insecticide application rate	lbs./ac.	0.6	*	*	*	*	*	*	*	0.4	*	*	0.4	*	0.4
Herbicides practices															
Land by number of treatments:															
No treatments	Percent	66	17	70	52	92	5	42	78	73	2	16	74	8	51
1 treatment	Percent	29	65	29	45	8	79	57	22	25	68	75	25	81	44
2 treatments	Percent	5	13	*	2	*	9	1	*	1	23	9	2	11	4
3 or more	Percent	*	6	1	1	*	7	*	*	1	6	*	*	1	1
Ave. number of treatments	No.	1.13	1.29	1.09	1.08	1.00	1.27	1.02	1.00	1.10	1.40	1.11	1.07	1.14	1.13
Land by number of ingredients applied:															
1 active ingredient	Percent	11	16	7	28	3	11	26	16	16	9	15	21	24	20
2 active ingredients	Percent	18	20	24	16	5	62	31	6	9	21	54	7	23	19
3 active ingredients	Percent	5	16	*	3	*	15	*	*	1	33	15	1	27	6
4 or more	Percent	*	30	*	1	*	7	*	*	*	33	*	*	18	4
Ave. number of ingredients	No.	1.8	2.8	1.8	1.5	1.6	2.2	1.5	1.3	1.4	3.1	2.0	1.3	2.5	1.9
Area treated:															
Before planting	Percent	6	6	*	3	2	1	4	*	3	3	2	4	6	3
At planting	Percent	3	1	1	1	*	2	1	*	*	2	*	2	5	1
After planting	Percent	23	74	29	43	6	87	51	22	22	74	75	21	77	42
Before/at	Percent	*	*	*	*	*	*	*	*	*	*	*	*	1	*
Before/after	Percent	*	2	*	1	*	4	*	*	1	15	7	1	5	2
At/after	Percent	2	*	*	*	*	*	*	*	*	3	*	*	*	*
Before/at/after	Percent	*	*	*	*	*	1	*	*	*	*	*	*	*	*
By farm operator only	Percent	20	56	11	16	3	64	19	6	8	38	35	10	44	20
By custom applicator	Percent	14	25	20	32	5	29	37	16	17	47	48	18	46	27
By both	Percent	*	2	*	*	*	2	*	*	*	13	1	*	2	1
By ground broadcast	Percent	26	58	29	43	8	69	43	22	21	56	46	20	49	37
By aerial broadcast	Percent	8	22	1	4	*	24	11	*	4	53	37	8	40	11
By in furrow	Percent	*	1	*	*	*	4	*	*	*	*	2	*	1	*
By chemigation	Percent	2	5	*	*	*	1	*	*	1	*	*	*	1	*
By spot treatment	Percent	*	1	*	*	*	6	1	*	*	1	*	1	4	1
Other pest management practices															
Plant density:															
< 1 million plants	Percent	9	7	1	5	6	22	4	1	4	12	15	24	19	9
1 mil. - 2 mil plants	Percent	55	52	52	37	73	67	50	49	44	71	55	50	68	49
> 2 million plants	Percent	36	41	47	58	21	11	46	49	52	17	30	25	14	43
Ave. plant population	million plants/acre	1.76	1.92	2.0	2.2	1.7	1.4	2.0	2.1	2.1	1.6	1.7	1.6	1.4	1.9
Tillage system:															
Conventional w/o m/bd. plow	Percent	71	62	69	76	61	76	78	54	77	63	62	85	77	74
Conventional with m/bd plow	Percent	4	14	*	9	3	4	8	7	17	26	*	1	5	8
Mulch tillage	Percent	24	19	9	14	6	13	6	3	5	10	24	12	14	12
No till	Percent	2	5	22	1	28	7	7	35	*	*	10	2	4	5
Ave number of tillages	No.	5.5	3.6	2.2	5.4	2.5	4.1	5.5	2.2	5.2	5.7	3.7	4.7	5.6	4.9
Used a crop rotation	Percent	52	95	97	52	98	94	95	100	15	100	86	44	89	61

1/ Units reported as percent represent percentage of harvested area.

* insufficient data to make an estimate.

Source: USDA, 1994 Cropping Practices Survey

Table 5—Pest management practices on spring wheat, major producing States, 1994

Data item	Units 1/	----- Other spring wheat -----				Durum	Total
		MN	MT	ND	SD	ND	
Planted area	1,000 ac.	2,600	3,450	9,100	2,100	2,450	19,700
Land receiving pesticides	Percent	100	94	96	83	95	95
Land receiving herbicides	Percent	100	94	96	83	95	95
Land receiving insecticides	Percent	2	*	*	*	*	*
Land receiving fungicides	Percent	8	*	1	*	6	2
Amount of pesticide applied	1,000 lbs.	1,980	1,394	5,145	633	1,465	10,616
All pesticide application rate	lbs./ac.	0.8	0.4	0.6	0.4	0.6	0.6
Herbicide applied	1,000 lbs.	1,738	1,394	4,750	633	1,379	9,894
Herbicide application rate	lbs./ac.	0.7	0.4	0.5	0.4	0.6	0.5
Herbicide practices							
Land by number of treatments:							
No treatments	Percent	*	6	4	17	6	5
1 treatment	Percent	79	90	68	83	64	74
2 treatments	Percent	18	4	28	*	29	19
3 treatments	Percent	3	*	*	*	3	1
Ave. number of treatments	No.	1.24	1.04	1.29	1.00	1.37	1.23
Land by number of ingredients applied:							
1 active	Percent	18	14	25	23	26	22
2 active	Percent	24	63	32	30	44	38
3 active	Percent	34	15	33	19	20	27
4 or more	Percent	24	3	7	11	5	8
Ave. number of ingredients	No.	2.7	2.1	2.2	2.2	2.1	2.2
Area treated:							
Before planting	Percent	*	3	2	2	5	2
At planting	Percent	2	1	1	4	1	1
After planting	Percent	94	86	73	77	67	78
Before/at	Percent	*	*	2	*	*	1
Before/after	Percent	5	3	12	*	23	10
At/after	Percent	*	1	*	*	*	*
By farm operator only	Percent	74	74	75	49	78	72
By custom applicator	Percent	21	20	12	34	12	17
By both	Percent	5	*	1	*	5	2
By ground broadcast	Percent	85	75	73	66	74	74
By aerial broadcast	Percent	13	19	14	15	22	16
By in furrow	Percent	*	*	3	2	10	3
By chemigation	Percent	2	*	*	*	*	*
By spot treatment	Percent	5	*	*	*	3	1
Other pest management practices							
Plant density:							
< 1 million plants/acre	Percent	5	35	10	19	40	18
1 mil. - 2 mil plants	Percent	48	64	58	64	56	58
> 2 million plants/acre	Percent	45	1	30	8	3	21
Ave. plant population	million plants/ac	1.9	1.2	1.7	1.3	1.1	1.5
Tillage system:							
Conventional w/o m/bd. plow	Percent	77	61	49	53	60	57
Conventional with m/bd. plow	Percent	16	1	8	6	1	7
Mulch tillage	Percent	6	25	39	32	33	31
No till	Percent	*	13	3	9	6	5
Ave. number of tillages	No.	3.7	3.9	3.3	2.7	3.8	3.4
Used a crop rotation	Percent	100	100	100	100	100	100

1/ Units reported as percent represent percentage of planted area.

* Insufficient data to make an estimate.

Source: USDA, 1994 Cropping Practices Survey

Table 6—Pest management practices on fall potatoes, major producing States, 1994

Data item	Units 1/	CO	ID	ME	MI	MN	NY	ND	OR	PA	WA	WI	Total
Planted area	1,000 ac.	74	410	78	44	74	29	133	54	19	152	73	1,140
Land receiving pesticides	Percent	100	98	100	100	100	100	100	100	100	100	100	99
Land receiving herbicides	Percent	80	91	95	96	52	69	58	91	64	90	92	83
Land receiving insecticides	Percent	70	75	93	100	100	99	99	86	100	99	100	88
Land receiving fungicides	Percent	95	53	100	100	94	80	100	77	97	92	99	80
Land receiving other pesticides	Percent	38	41	98	78	81	51	54	59	42	82	91	60
Amount of pest	1,000 lbs.	1,741	37,611	1,818	1,124	421	632	1,214	4,862	465	22,125	3,043	75,056
All pesticide application rate	lbs./ac.	23.5	93.2	23.3	25.5	5.7	21.7	9.1	90.9	24.5	145.6	41.7	66.2
Herbicide applied	1,000 lbs.	246	1,056	54	66	105	43	112	169	36	338	81	2,306
Herbicide application rate	lbs./ac.	4.1	2.8	0.7	1.5	2.7	2.1	1.4	3.5	3.0	2.5	1.2	2.4
Insecticide applied	1,000 lbs.	51	896	219	364	66	285	180	253	180	847	143	3,486
Insecticide application rate	lbs./ac.	1.0	2.9	3.0	8.2	0.9	13.5	1.4	5.5	9.4	5.6	2.0	3.6
Fungicide applied	1,000 lbs.	174	412	945	481	220	181	666	178	178	803	860	5,099
Fungicide application rate	lbs./ac.	2.5	1.9	12.1	11.0	3.1	8.4	5.0	4.3	9.6	5.8	11.8	5.6
Other pesticide applied	1,000 lbs.	1,269	35,015	600	216	30	8	277	4,262	74	20,379	1,977	64,107
Other pesticides application	lbs./ac.	52.8	211.5	7.9	6.3	0.5	0.6	3.7	133.9	9.2	161.0	29.5	94.4
Herbicide practices													
Land by number of treatments applied:													
No treatments	Percent	20	9	5	4	48	31	42	9	36	10	8	17
1 treatment	Percent	55	61	91	65	47	40	52	51	43	47	64	58
2 treatments	Percent	20	27	2	31	3	29	5	35	19	32	22	22
3 or more	Percent	5	3	1	*	2	1	2	4	1	10	5	3
Ave. number of treatments	No.	1.56	1.41	1.13	1.32	1.12	1.46	1.14	1.48	1.35	1.60	1.36	1.39
Land by number of ingredients applied:													
1 active	Percent	33	31	89	23	45	20	36	27	7	20	38	34
2 active	Percent	48	41	*	50	6	41	20	29	33	47	43	35
3 or more	Percent	*	19	*	24	*	8	2	35	23	23	12	14
Ave. number of ingredients	No.	1.6	1.9	1.1	2.0	1.1	1.8	1.4	2.1	2.3	2.1	1.7	1.8
Area treated:													
Before planting	Percent	*	16	*	25	34	11	9	9	15	6	17	13
At planting	Percent	*	6	*	*	*	7	*	4	1	1	3	3
After planting	Percent	70	56	94	58	17	41	49	69	37	63	70	58
Before/at	Percent	*	*	*	1	*	*	*	*	*	1	*	*
Before/after	Percent	*	5	1	9	*	11	*	9	6	8	2	4
At/after	Percent	*	8	*	*	*	*	*	*	*	9	*	4
By farm operator only	Percent	65	62	94	69	46	55	50	47	58	49	71	60
By custom applicator	Percent	5	24	1	23	6	15	8	30	1	27	20	18
By both	Percent	*	5	*	1	*	*	*	13	*	13	1	4
By ground broadcast	Percent	3	50	17	69	49	22	45	41	48	30	81	43
By aerial broadcast	Percent	*	6	*	6	2	12	6	28	*	28	6	9
By in furrow	Percent	*	5	1	*	*	*	*	*	*	4	1	2
By chemigation	Percent	68	31	*	4	*	*	*	26	*	37	3	22
By band treatment	Percent	*	2	*	11	*	*	6	3	4	3	2	3
By directed spray	Percent	*	11	79	11	1	35	*	10	6	11	1	13
By injected or knifed in	Percent	*	3	*	*	*	*	*	1	*	2	*	1
By spot treatment	Percent	*	*	*	*	*	*	4	*	*	*	1	*
Insecticide practices													
Land by number of treatments applied:													
No treatments	Percent	30	25	7	*	*	1	1	14	*	1	*	12
1 treatment	Percent	38	59	16	3	19	28	26	33	3	13	4	33
2 treatments	Percent	23	12	23	5	57	5	40	13	13	11	32	20
3 treatments	Percent	8	3	24	8	2	16	21	10	12	20	31	12
4 treatments	Percent	3	1	7	16	20	14	5	8	9	18	14	8
5 treatments	Percent	*	*	9	1	1	3	6	10	22	31	12	7
6 treatments	Percent	*	*	13	68	1	32	1	11	40	6	6	7
Ave. number of treatments	No.	1.6	1.3	3.2	7.3	2.3	4.5	2.3	2.9	5.5	3.6	3.2	2.7
Land by number of ingredients applied:													
1 active	Percent	60	58	26	5	80	17	50	38	1	16	16	43
2 active	Percent	3	13	32	11	16	37	41	14	9	31	28	21
3 active	Percent	5	3	16	14	3	10	8	12	12	23	41	11
4 active	Percent	3	1	14	19	1	17	*	8	15	19	12	7
5 active	Percent	*	*	1	8	*	10	*	1	15	8	2	2
6 active	Percent	*	*	4	15	*	8	*	13	13	3	*	2
7 or more	Percent	*	*	28	*	*	*	*	33	33	*	*	1
Ave. number of ingredients	No.	1.3	1.3	2.4	5.1	1.2	2.9	1.6	2.5	5.4	2.8	2.6	2.1
Area treated:													
Before planting	Percent	*	7	*	*	*	*	7	1	*	3	1	4
At planting	Percent	*	30	2	*	*	5	1	9	*	1	1	12
After planting	Percent	63	27	90	81	99	91	89	49	72	57	87	59
Before/at	Percent	*	1	*	*	*	*	*	1	*	*	*	*
Before/after	Percent	*	2	*	3	*	*	*	7	*	17	3	4
At/after	Percent	*	7	1	13	1	1	2	12	22	21	8	8
Before/at/after	Percent	*	*	*	*	*	*	*	7	*	*	*	*
By farm operator only	Percent	20	48	91	45	32	75	75	20	90	28	51	49
By custom applicator	Percent	35	18	1	20	55	23	17	27	*	42	37	25
By both	Percent	8	9	*	31	13	*	7	38	3	29	12	13
By ground broadcast	Percent	*	13	14	49	43	18	68	32	76	35	57	30
By aerial broadcast	Percent	43	18	1	44	67	25	24	50	3	84	45	35
By in furrow	Percent	*	18	1	8	1	*	*	9	9	12	5	9
By chemigation	Percent	28	3	*	*	1	*	*	16	*	22	2	7
By band treatment	Percent	*	29	2	14	2	1	31	26	16	19	7	19
By directed spray	Percent	*	1	76	20	2	54	*	3	12	3	7	9
By injected or knifed in	Percent	*	6	*	*	*	*	*	12	*	4	*	3
By spot treatment	Percent	*	*	*	9	*	3	*	*	*	*	*	*

Continued

Table 6—Pest management practices on fall potatoes, major producing States, 1994—continued

Data item	Units 1/	CO	ID	ME	MI	MN	NY	ND	OR	PA	WA	WI	Total
Fungicide practices													
Land by number of treatments applied:													
No treatments	Percent	10	51	1	6	9	21	10	28	4	22	1	26
1 treatment	Percent	15	24	*	9	16	10	9	19	12	16	1	16
2 treatments	Percent	25	17	1	10	50	12	16	23	22	17	3	18
3 treatments	Percent	28	6	3	1	3	10	22	18	12	13	7	10
4 treatments	Percent	8	1	*	9	16	5	8	5	19	14	7	6
5 treatments	Percent	*	1	8	5	*	9	7	5	9	4	7	3
6 or more	Percent	16	1	87	61	7	33	27	2	20	14	74	11
Ave. number of treatments	No.	3.0	1.8	9.6	7.1	2.6	5.1	3.9	2.4	4.0	3.4	8.8	4.2
Land by number of ingredients applied:													
1 active ingredients	Percent	55	33	41	26	50	41	9	25	24	23	12	30
2 active ingredients	Percent	33	15	24	14	14	23	26	18	36	13	18	19
3 active ingredients	Percent	8	4	11	24	18	16	43	17	21	17	22	15
4 active ingredients	Percent	*	1	21	16	2	*	22	9	13	28	16	11
5 active ingredients	Percent	*	*	4	20	11	*	*	5	*	10	23	5
6 or more	Percent	*	*	*	*	*	*	*	4	3	*	7	1
Ave. number of ingredients	No.	1.5	1.5	2.2	2.9	2.1	1.7	2.8	2.5	2.4	2.9	3.4	2.3
Area treated:													
Before planting	Percent	*	1	*	*	*	*	*	*	*	3	1	1
At planting	Percent	*	*	*	*	*	*	*	*	*	1	*	*
After planting	Percent	88	51	100	96	94	80	100	75	91	83	95	77
Before/after	Percent	*	1	*	*	*	*	*	*	*	2	1	1
At/after	Percent	*	1	*	*	*	*	*	2	*	3	1	1
Before/at/after	Percent	*	*	*	*	*	*	*	*	*	1	*	*
By farm operator only	Percent	45	14	99	45	29	57	68	12	87	23	47	36
By custom applicator	Percent	35	37	1	36	52	15	16	42	1	45	40	33
By both	Percent	8	3	*	15	14	8	17	23	1	24	12	10
By ground broadcast	Percent	*	4	14	44	43	24	74	16	73	18	55	24
By aerial broadcast	Percent	40	40	1	44	64	25	32	57	3	77	46	43
By in furrow	Percent	*	1	*	*	*	*	*	*	*	*	1	*
By chemigation	Percent	55	12	*	*	1	*	7	35	*	41	4	16
By band treatment	Percent	*	1	1	*	1	*	16	3	3	*	2	3
By directed spray	Percent	*	*	85	20	1	42	*	3	12	2	7	9
By injected or knifed in	Percent	*	1	*	*	*	*	*	*	*	1	1	*
By spot treatment	Percent	*	*	*	3	*	*	*	*	*	*	*	*
Other pesticide practices 2/													
Land by number of treatments applied:													
No treatments	Percent	63	59	2	23	19	49	46	41	58	18	9	40
1 treatment	Percent	38	34	9	44	63	25	45	33	24	51	33	38
2 treatments	Percent	*	7	66	20	19	24	7	23	13	23	44	18
3 or more	Percent	*	*	23	14	*	1	1	4	4	8	14	4
Ave. number of treatments	No.	1.0	1.2	2.1	1.6	1.2	1.5	1.2	1.5	1.5	1.4	1.8	1.4
Land by number of ingredients applied:													
1 active ingredient	Percent	38	33	86	66	81	43	51	34	31	47	74	48
2 or more	Percent	*	7	12	11	8	8	3	26	10	35	17	11
Ave. number of ingredients	No.	1	1	1	1	1	1	1	2	1	2	1	1
Area treated:													
Before planting	Percent	*	17	*	*	*	*	*	28	*	47	2	14
After planting	Percent	38	18	98	70	81	51	53	19	42	15	87	40
Before/at	Percent	*	*	*	*	*	*	*	*	*	1	*	*
Before/after	Percent	*	5	*	4	*	*	1	12	*	19	2	5
By farm operator only	Percent	5	20	95	51	37	42	38	20	42	25	64	33
By custom applicator	Percent	33	18	3	23	45	9	12	24	*	48	25	23
By both	Percent	*	2	*	*	*	*	4	15	*	9	2	3
By ground broadcast	Percent	5	18	14	46	44	20	44	18	36	19	72	26
By aerial broadcast	Percent	28	5	*	23	36	7	14	17	*	18	14	13
By in furrow	Percent	*	*	*	*	*	*	*	*	*	*	*	*
By chemigation	Percent	*	10	*	*	*	*	*	15	*	46	*	10
By band treatment	Percent	*	1	*	*	*	*	*	*	3	*	1	*
By directed spray	Percent	*	4	84	9	2	24	*	4	3	3	9	10
By injected or knifed in	Percent	*	8	*	*	*	*	*	21	*	16	1	6
By spot treatment	Percent	5	*	*	*	*	*	*	*	*	*	*	*
Other pest management practices													
Tillage system:													
Conventional without mld. plow	Percent	72.5	77.2	35.0	28.8	25.2	12.1	55.6	69.2	6.0	63.3	34.1	58.4
Conventional with mld. plow	Percent	2.5	19.7	45.7	60.0	28.4	73.2	34.3	29.8	92.5	31.0	58.0	31.2
Mulch tillage	Percent	25.0	1.6	19.3	10.0	46.5	*	5.6	0.9	*	3.8	7.2	8.6
No till	Percent	*	0.4	*	*	*	2.7	*	*	*	*	*	0.2
Average number of tillages	No.	4.62	4.72	3.16	4.20	3.32	3.83	4.27	5.82	3.45	5.60	3.50	4.49
Land cultivated													
Number of cultivations	Percent	87.5	93.4	95.0	90.0	99.2	98.7	100.0	92.3	76.1	90.5	78.3	92.6
1 cultivation	Percent	52.5	61.6	5.0	30.0	6.1	18.4	*	29.7	19.4	46.8	26.1	37.6
2 cultivations	Percent	27.5	26.6	31.4	55.0	17.2	49.9	20.4	50.2	25.4	36.1	51.4	31.3
3 cultivations	Percent	7.5	5.2	58.6	5.0	75.9	30.3	79.6	12.4	31.3	7.6	0.7	23.7
Ave times cultivated	No.	1.5	1.4	2.6	1.8	3.6	2.3	3.0	1.9	2.4	1.6	1.7	2.0

1/ Units reported as percent represent percentage of planted area.

2/ Includes all other pesticides used by surveyed potato growers such as defoliant and growth regulators.

* Insufficient data to make an estimate.

Source: USDA, 1994 Cropping Practices Survey



U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT #AER-717

Trends in Use of Fertilizers And Pesticides

May 1995

Contact: Biing-Hwan Lin (202) 219-0854

Pesticides and fertilizers contribute to increased productivity in agriculture, but their use is also associated with potential human health, wildlife, and environmental risks. Pesticides used on major crops more than doubled during 1964-82 (from 233 to 612 million pounds of active ingredients).

Total expenditures for agricultural chemicals showed a continuous upward trend before peaking in 1982. During this time, fertilizers and pesticides were applied to more acres, and application rates increased. Since 1982, total agricultural chemical usage has varied mainly with changes in planted acreage, government set-aside requirements, and levels of pest infestation.

Pesticide and Fertilizer Use and Trends in U.S. Agriculture, a new report from USDA's Economic Research Service, provides information to facilitate policy and regulations related to agrichemicals, and to identify measures that can reduce agrichemical use on corn. The report describes the trend in pesticide and fertilizer use in selected crops from 1964 to 1992. Information is reported for four major pesticide types (herbicides, insecticides, fungicides, and other pesticides). Fertilizers are reported by plant nutrient (nitrogen, phosphate, and potash).

Because recent U.S. Department of Agriculture (USDA) chemical use surveys have not covered all agricultural use, the pesticide use trend is limited to those crops with consistent coverage over time. The included crops (corn, cotton, soybeans, wheat, rice, grain sorghum, peanuts, fall potatoes, other vegetables, citrus, and apples) occupied about 250 million acres (73 percent) of U.S. cropland in the early 1990's and accounted for about 80 percent of total pesticide use in U.S. agriculture during the 1960's. The fertilizer use trend is reported annually for all purposes (agriculture and nonagriculture) and for four crops (corn, cotton, soybeans, and wheat).

Highlights of the report:

- During the 1960's, agricultural pesticide use was dominated by insecticides, accounting for half of all pesticides used. Since 1976, insecticide use has declined, mainly in cotton production, and has accounted for 10 percent of total agricultural pesticide use in recent years.
- During 1964-82, agricultural herbicide use increased more than eightfold, accounting for much of the increase in total pesticide use during the period. Herbicide use accounted for about 70 percent of agricultural pesticide use in recent years. Fungicides and other pesticides (soil fumigants, growth regulators, and harvest aids) accounted for about one-fifth of total pesticides in recent years.

To Order This Report...

The information presented here is excerpted from *Pesticide and Fertilizer Use and Trends in U.S. Agriculture*, AER-717, by Biing-Hwan Lin, Merritt Padgitt, Len Bull, Herman Delvo, David Shank, and Harold Taylor. The cost is \$9.00.

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SUMMARY OF REPORT #AIB-716

Mix of Incentives Encourages Farmers to Adopt Water Quality Practices

May 1995

Contact: Peter M. Feather, (202) 501-8357, or Joseph Cooper, (202) 501-6970

Agricultural chemicals and sediment from cropland may reduce the quality of America's surface and ground water resources. The Clean Water Act stipulates that individual States are responsible for controlling agricultural nonpoint source pollution. Most State plans rely chiefly on education and technical assistance to promote less polluting practices. A new report from USDA's Economic Research Service, *Voluntary Incentives for Reducing Agricultural Nonpoint Source Water Pollution*, presents recent research findings on the success of existing incentive practices to control agricultural nonpoint source pollution. Because profitability drives production decisions, these programs tend to be most successful when they promote inexpensive changes in existing practices.

Impaired surface water quality from cropland erosion alone has resulted in \$2-\$8 billion in annual losses to recreational and commercial fishing, boating, municipal treatment plants, water storage facilities, and navigable waterways. Both voluntary and mandatory policies have been implemented and studied to reduce agricultural pollution. Voluntary incentives rely on providing the farm operator with an incentive to adopt less polluting technologies. These approaches commonly use cost-shar-

ing or education and technical assistance to encourage farm operators to use less polluting practices. Regulations or taxes to force farm operators to reduce pollution levels are two examples of mandatory approaches.

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